



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/530,965

04/11/2005

Kota Kitamura

12477/8

2370

23838 7590 09/19/2007
KENYON & KENYON LLP
1500 K STREET N.W.
SUITE 700
WASHINGTON, DC 20005

EXAMINER

BERNSHTEYN, MICHAEL

ART UNIT

PAPER NUMBER

1713

MAIL DATE

DELIVERY MODE

09/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|---------------------------------------|--|--|
| Office Action Summary | Application No. 10/530,965 | Applicant(s) KITAMURA ET AL. | |
| | Examiner Michael Bernshteyn | Art Unit 1713 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 8-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 2-7 and 20-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-28 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>05/01/06, 04/11/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election without traverse of claims 2-7 and 20-28 in the reply filed on July 18, 2007 is acknowledged.
2. Claims 1 and 8-19 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on July 18, 2007.
3. Claims 1-28 are pending, claims 2-7 and 20-28 are active.

Specification

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 2-4, 20 and 23-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Formato et al. (U. S. Patent 6,248,469 or WO 9/10165).

With regard to the limitations of claims 2-4, Formato discloses a method of producing a membrane of the present invention comprises the steps of sulfonating the pores of the polymer substrate with a sulfonating agent (col. 8, lines 26-29). The composite SPEMs of the present invention comprise a porous polymer substrate interpenetrated with an ion-conducting material. The porous polymer substrate serves as a mechanically, thermally, chemically and oxidatively durable support for the ion-conducting material, e.g., polymer (col. 9, lines 14-19). The ion-conducting polymer substantially interpenetrates the micro infrastructure of the porous polymer substrate. This configuration, which can be made quite thin, promotes efficient proton transport across the membrane and minimizes water management problems. As a consequence, eventual membrane dehydration, parasitic losses and loss of ionic conductivity can be substantially prevented (col. 9, lines 30-35).

Formato discloses the corresponding structures for certain polymers, which are preferably used for the preparation of ion exchange resin (tables 4-7), which are substantially identical to the formulas of instant claims 2-4.

With regard to the limitations of claims 20 and 23-25, Formato discloses a fuel cell that includes polymer electrolyte membrane, which comprises an ion-conducting resin interpenetrated into a porous polymer substrate (col. 5, lines 62-64). Preferred substrates include **polybenzazoles** (PBZ) such as polybenzoxazole (PBO), polybenzothiazole (PBT) and polybenzimidazole (PBI) (col. 6, lines 25-30, Table 4, col. 19). As seen in figure 1, the conductive resin not only fills the pores of the substrate, but also coats its **two surfaces**. The substrate has a porosity of about 40 to 90 percent

Art Unit: 1713

(column 6, lines 22-24), which would give it an open surface porosity of at least 40 percent (Examples 9-13, col. 42, use PBO as the substrate polymer).

6. Claims 5-7 and 27-28 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Formato et al. (U. S. Patent 6,248,469 or WO 9/10165).

With regard to the mathematical expressions 1-3, instantly claimed in claims 5-7, Formato is silent about it. However, in view of substantially identical structures of the polymers for ion exchange compositions between Formato and instant claims, it is the examiner position that Formato's composite ion exchange membrane inherently possesses these properties. Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. *In re Fitzgerald* 619 F 2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

Even assuming that the claims are not anticipated by the reference, it would have been obvious to one of ordinary skill in the art to make the polymer having the claimed properties for the composite ion exchange membrane because it appears that the reference generically embrace the claimed subject matter and the person of ordinary skill in the art would have expected all embodiments of the reference to work. Applicants have not demonstrated that the differences, if any, between the claimed subject matter and the subject matter of the prior art examples give rise to unexpected products.

With regard to the mathematical expressions 1-3, instantly claimed in claims 27 and 28, Formato is silent about it. However, in view of substantially identical structures

of the composite ion exchange membrane between Formato and instant claims, it is the examiner position that Formato's composite ion exchange membrane inherently possesses these properties. Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. *In re Fitzgerald* 619 F 2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

Even assuming that the claims are not anticipated by the reference, it would have been obvious to one of ordinary skill in the art to make the composite ion exchange membrane having the claimed properties because it appears that the reference generically embrace the claimed subject matter and the person of ordinary skill in the art would have expected all embodiments of the reference to work. Applicants have not demonstrated that the differences, if any, between the claimed subject matter and the subject matter of the prior art examples give rise to unexpected products.

7. Claims 21, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Formato et al. (U. S. Patent 6,248,469 or WO 9/10165).

With regard to the limitations of claims 21, 22, and 26-28, Formato does not disclose the thickness of each surface layers, an aperture ratio, and the content of polybenzazole-type polymer into the film.

It is noted that the above mentioned parameters are the result effective variable, and therefore, it is within the skill of those skilled in the art to find the optimum value of a result effective variable, as per *In re Boesch and Slaney* 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382: "The normal desire of scientists or artisans to improve upon what is already generally known provides the

motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."

8. Claims 2-7, 20, and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (JP 2002-203576) in view of McGrath et al. (WO 02/25764).

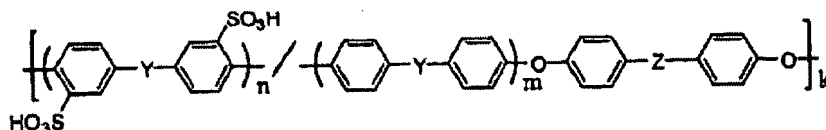
With regard to the limitations of claims 2 and 20, Suzuki discloses a composite ion exchange membrane comprising an ion exchange resin composition and a substrate membrane having open cells passing through the membrane wherein the substrate membrane is impregnated with the ion exchange resin composition (claim 1, page 1).

With regard to the limitations of claims 23-25, Suzuki discloses that the support membrane contains a polybenzazole type polymer as a material (pages 5-6, [0042]).

With regard to the limitations of claims 2-7, McGrath discloses sulfonated copolymers and membranes that exhibit improved thermal stability as well as improved protonic conductivity in fuel cell applications.

McGrath discloses polymerizing a sulfonated activated aromatic monomer and an unsulfonated activated aromatic monomer with a suitable comonomer such as a bisphenol to produce a sulfonated aromatic copolymer.

McGrath discloses several embodiments, which include a sulfonated copolymer having the following chemical structure (page 3, line 4 through page 5, line 10):



where $n/n+m$ ranges from about 0.001 to about 1. Y may be selected from the group consisting of -S-, S(O)-, -S(O)₂-, -C(O)-, -P(O)(C₆H₅)- or combinations thereof. Z may be selected from the group consisting of a direct carbon-carbon single bond, -C(CH₃)₂-, -C(CF₃)₂-, -C(CF₃)(C₆H₅)-, -C(O)-, -S(O)₂-, and -P(O)(C₆H₅)-. In a preferred embodiment, $n/n+m$ ranges from about 0.3 to about 0.6.

These structures are substantially identical and contain all the limitations of instant claims 2-7.

Both references are analogous art because they are from the same field of endeavor concerning new composite ion exchange membrane.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate sulfonated aromatic copolymer as taught by McGrath in Suzuki's composite ion exchange membrane in order to achieve improved thermal stability as well as improved protonic conductivity in fuel cell applications (WO'764, page 3, lines 5-6), and thus to arrive at the subject matter of instant claim 2 and dependent claims 3-7.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.


Art Unit: 1713

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael Bernshteyn
Patent Examiner
Art Unit 1713

MB
09/17/2007


DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700